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instruments, it would, I think, be desirable. I have no doubt that other parties employed, like myself, for the late Transit of *Venus*, have felt greatly the want of circumpolar stars, and the want will be again felt in 1882. Few have had more powerful means of observing transits than myself, yet stars so small as most of those of the Oxford list would have been quite useless to me, and I should have been obliged to select some (as I have done) from such Catalogues as were available. Another reason why I think a better selection might be made is, because I doubt whether the *close* circumpolar stars are either the most convenient or most accurate for determinations of azimuth. I find that stars 10 or 12 degrees distant from the Pole are far more accurately observed, and they have the great advantage that they pass the wires much more quickly.

I think, then, that the stars selected should, if possible, not be of less than 6·5 magnitude, that they may be generally available; and that no loss of practical accuracy would result if the limit of polar distance were 15°. I do not offer my own selection, as it was made entirely from the Greenwich Catalogues, and is very defective, especially in the early hours of Right Ascension. This has partly arisen from my not using stars which had been observed very few times, but more from an apparent want of large stars in that part of the sky. It is probable, however, that a better selection may be made. If satisfactory means of determining the azimuthal correction of the Transit in each sidereal hour could be given, it would be a very great boon to many establishments where time is wanted, but where meridional observation is not a principal object.

Roorkee, September 26, 1875.

On the Aspect of the Zodiacal Light opposite the Sun.

By T. W. Backhouse.

I have lately observed a curious phenomenon respecting the Zodiacal Light which I have never heard described before; that is, a comparatively bright patch opposite the Sun. It does not appear to be generally known that the Zodiacal Light is visible at all opposite the Sun; but it is so, very commonly. But the phenomenon I now refer to is one I never noticed with such distinctness previous to September 28; on which night there was, in *Pisces*, a remarkably definite oval patch of light about 20° by 14° in diameter. Its boundary was at ϵ, ω, 21 and 29 *Piscium*, and 13 and 20 *Ceti*. Further west the Zodiacal Light faded away very suddenly; indeed at first (at $10^h\ 15^m$) I could not perceive it any further in this direction; but afterwards I could trace it, though extremely faint, to σ *Aquarii*. East of the

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bright patch it faded more gradually, but at first rapidly; and was visible to near the *Pleiades*, beyond which it was rendered invisible by the Milky Way. Southwards I could, later on, trace the light, though very faint, to ι *Ceti*; and northwards to γ *Pegasi*, if not beyond. East and west of the bright patch, the Zodiacal Light was only 10° or 12° wide.

At 10.45 I perceived that the light of the bright patch was far from uniform, being rapidly concentrated, chiefly nearly along the ecliptic; the brightest part was at, or 1° north of, 44 *Piscium*. This point I find was exactly, to a degree, opposite the Sun. The phenomenon continued much the same up to $11^h\ 50^m$; and during the succeeding 10 days the point of maximum brightness gradually moved eastwards among the stars: the bright patch appearing, however, less definite.

On examining my old Notes, I find that although I never before saw so definite a patch of light opposite the Sun, still I have records of six previous instances when the light within a few degrees of the point opposite the Sun was brighter than that some distance further *p* and *f*, besides one where the greater faintness of the light *f* that point is rather doubtful. Besides these, I find 14 nights (previous to this autumn) when the light was brighter opposite the Sun than on one side of that region, the other side being obscured by the Milky Way or from some other cause. On the other hand, on October 16, 1868, I could not see the Zodiacal Light at the point opposite the Sun, though it was just perceptible a little further *f*. Also I have often seen it in that region without noticing any inequalities in it.

These discrepancies are not to be wondered at, when we consider the faintness of the phenomenon. I cannot say whether the bright patch has *really* been exceptionally definite of late; or whether it is only that my eyes have become better able to see it. The likelihood of such an occurrence is not sufficiently borne in mind by observers; who, when they see the Zodiacal Light brighter than they ever did before, are apt to conclude it has increased in brightness; while really it may only be that their eyes have become more sensitive to it. All that part of it opposite the Sun, though quite plain to my eyes, is of course very faint—so faint that it is quite doubtful whether it would be visible to a person whose eyes had not been trained to see objects of the kind. I never saw this part till 1868, though I have observed the Zodiacal Light since 1861.

Taking these circumstances into account, it seems probable that the Zodiacal Light is *always* brighter at the point of the sky opposite the Sun than at a little distance on each side of that. I have not made many observations of the actual intensity of this light; but it is probably about equal to that part of the Zodiacal Light 100° or 110° off the Sun; also to the Milky Way in the greater part of *Perseus*.

As to the cause of this phenomenon: it is highly improbable that there [illegible] long protuberance of the lenticular disk (which is

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generally thought to be the shape of the Zodiacal Light), away from the Earth ; and one is reminded of the anthelion on dew, but it is not likely we have in this case to deal with drops : but it is still possible that the zodiacal light is composed of particles which reflect light more readily straight towards the Sun than at other angles.

I subjoin the position of the brightest part of the light on every night on which I have seen it pretty definite. The longitude given is the distance *f* the Sun. In making nearly all these observations I was quite unaware of the actual position among the stars of the point opposite the Sun ; so that my judgment of the position of maximum brightness was quite unbiassed.

Year.	Mo.	Day.	Long. *f*. Sun. °	Lat. °	Year.	Mo.	Day.	Long. *f*. Sun. °	Lat. °
1871	11	8	185	+3	1875	10	4	180	0
1872	10	9	about 182	0		10	5	179	0
1874	10	3	„ 186	+2		10	6	near 183	0
	11	6	„ 185	+3		10	8	„ 181	+1
1875	9	28	180	0		11	5	189–180	0
	10	2	179	0		11	7	186–178	+2

Sunderland, November 9, 1875.

Observations of the Zodiacal Light at Cadiz.

By Señor A. T. Arcimis.

(*Abstract of a Paper published in the "Bulletino Meteorologico del Collegio Romano.*")

For many years I have observed this phenomenon without the assistance of any instrument; but latterly, in February and subsequent months, I have made use of the spectroscope for the analyses of this luminous manifestation. The results of my investigations are contrary to the conclusions of Prof. Wright, of Yale College, and, notwithstanding my perfect confidence in what I have observed, I did not dare to publish a work that would be received probably with some diffidence without the powerful incitement of the illustrious Director of the Observatory of Rome.

In order that the reader may appreciate the accuracy of these observations, I think it right to give an account of the place where they were taken, and the instruments employed.

The city of Cadiz forms an almost regular polygon of five kilometers of perimeter, surrounded by the sea on all sides except on the east, where a narrow neck of land runs towards the mainland.